BOEM
Bureau of Ocean Energy Management

FACT SHEET

Research Related to the Deepwater Horizon Oil Spill

In response to the tragic Deepwater Horizon explosion and resulting oil spill in the Gulf of Mexico in 2010, the Department of the Interior launched reforms that represent the most aggressive and comprehensive changes to offshore oil and gas regulation and oversight in U.S. history. This was done to help ensure that the United States can safely and responsibly expand development of its domestic energy resources.

As our commitment and duty to the American people, BOEM and our colleagues in the Bureau of Safety and Environmental Enforcement (BSEE) will remain vigilant in instituting reform efforts and lessons learned since the tragic Deepwater Horizon event. Our goals are to ensure safe and environmentally responsible operations on the Outer Continental Shelf (OCS), the long-term improvement and restoration of the Gulf Coast, and protection of other unique ecosystems of the OCS. Below find summaries of some of the research either completed or in progress related to the 2010 spill. Over the years, we will continue to monitor and report impacts of the spill and improve our oil spill modeling capabilities.

Impact on Gulf Coast residents, communities and businesses in the first 20 months after the oil spill

Almost from the day of the spill, BOEM, as part of the former Minerals Management Service, re-directed a research team already in the area working on a different project. The new project focused on five key regional economic sectors – offshore oil and gas, fishing, tourism, shipbuilding and fabrication, and retail — and on non-governmental organizations (NGOs), the claims process, and the impacts on different ethnic groups. The study's success is largely due to BOEM'S ability to document the spill's social effects as they unfolded. Often such information is lost in the heat of the moment.

The study takes place in a region highly involved in the oil industry and accustomed to different types of disasters. Some of the effects of the spill were mitigated by the knowledge, understanding, expertise and mechanisms in place. Conversely, the spill's impacts were heightened by recent, severe hurricanes and flooding and by the fact that even short-term BOEM regulatory actions after the spill might have effects on areas highly involved in the OCS industry. The two-volume study report can be found online in BOEM's Environmental Studies Program Information System at:

"Offshore Oil and Deepwater Horizon: Social Effects on Gulf Coast Communities Volume I: Methodology, Timeline, Context, and Communities."

"Offshore Oil and Deepwater Horizon: Social Effects on Gulf Coast Communities Volume II: Key Economic Sectors, NGOs, and Ethnic Groups."

Aerial surveys to predict the trajectory of the oil slick

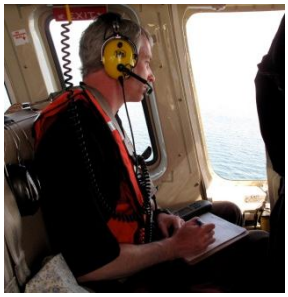
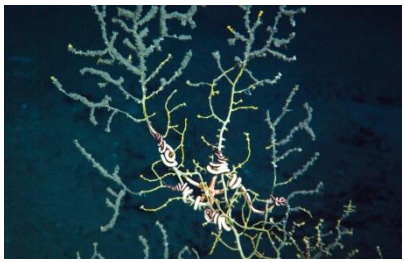


Photo credit: NOAA

On April 20, 2010, BOEM was conducting a comprehensive and international physical oceanographic study of the Loop Current in the Eastern Gulf of Mexico. In addition, the bureau had supplied temperature probes to the University of Miami as part of aerial survey research to gauge how tropical storms or hurricanes interact with the Loop Current. When the Deepwater Horizon event occurred, these aerial surveys were re-directed to support the real-time observations of the Loop Current, used to predict the trajectory of the oil slick. This invaluable data set of ocean temperature and currents was published as part of the American Geophysical Union's Monograph Series in 2011 entitled "Monitoring and Modeling the Deepwater Horizon Oil Spill: A Record-Breaking Enterprise." Data provided by BOEM's oil spill modeling group for this study informed NOAA observers during their aerial surveys of the DWH spill.
(Data set link: www.rsmas.miami.edu/…/upper-ocean-dynam…/research/oil-spill/)

Impact of the spill on coral habitats

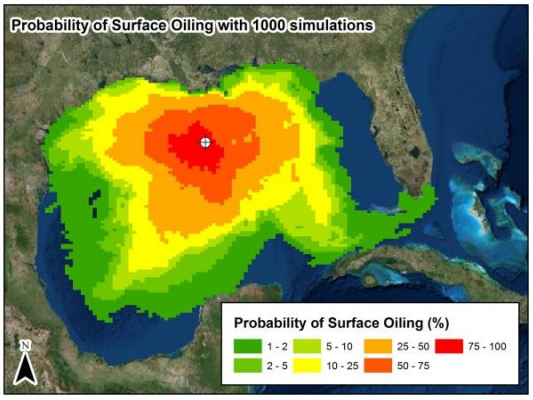


The bureau immediately saw the opportunity to adapt another ongoing study in the summer of 2010 to investigate the impacts of the DWH accident. Supported by BOEM, NOAA's Office of Exploration and Research and U.S. Geological Survey, this large interagency partnership study had been going on for almost two years. Entitled "Exploration and Research of Northern Gulf of Mexico Deepwater Natural and Artificial Hard Bottom Habitats with Emphasis on Coral Communities: Reefs, Rigs and Wrecks," (also known as Lophelia II), its purpose was to conduct exploration and science discovery on deepwater coral habitats in water depths ranging from 1,000 to 9,000 feet. Adapted to focus on DWH, researchers sought to identify potential coral habitats near the blowout site, including any located in the direction of known subsurface oil plumes. Scientists discovered the first impacted deep-water coral habitat in November 2010. Immediately following the spill, BOEM's Lophelia II study manager became the initial lead of the National Resource Damage Assessment (NRDA) Technical Working Group (TWG) for Deep-Sea Corals. Some of the principal investigators from the Lophelia II study were encouraged to join the TWG and began developing the first new study to continue investigations of impacts to the deep-sea corals discovered in 2010. Additional cruises followed, funded by NRDA and other entities.

Other findings from Lophelia II have significantly improved our understanding of deepwater coral ecosystems in the Gulf of Mexico and beyond, including new depth records for deep-sea coral Lophelia

pertusa, corals' genetic patterns and new archaeological sites. The interim report is here and find a video on the project here. *Top photo: An image of the impacted gorgonian coral, taken on Nov. 2, 2010, at the end of the expedition. Lower photo: A down-looking mosaic of a coral community at 1400m depth, including a variety of hard and soft corals. (Images courtesy of Lophelia II 2009 Expedition.)*

Oil spill modeling study



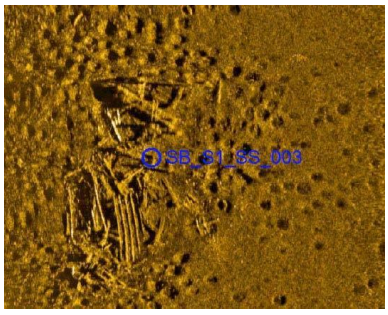
BOEM's oil spill modeling study is developing a next-generation 3D blowout model. The study is informed by the wealth of data collected during the Deepwater Horizon event. Oil spill transport during the event was impacted by many factors, including the unique properties of released oil and gas, application of sub-surface dispersants, and degradation and weathering processes. These factors are included in an advanced oil spill model in order to fully assess implications of the blowout. BOEM's primary goal is to learn from alternative scenario runs performed using the new model in order to inform oil spill risk assessment in the Gulf of Mexico. Simulation Modeling of Ocean Circulation and Oil Spills in the Gulf of Mexico (GM-11-02).

Photo: Illustration from the study showing the surface oiling probability for 1000 simulations using hindcasts from HYCOM currents and NOGAPS winds from 2006 to 2008. A 30 day spill with a constant release rate and 500 particles used to represent the oil was employed.

Using social science to assess the impact of the oil spill on tourism

The Deepwater Horizon (DWH) oil spill had an adverse impact on many tourism-related businesses such as hotels, restaurants, retailers, and tour operators. Investigators analyzed DWH claims, news reports, employment data, and conducted interviews with people involved in the tourism industry to better understand the impacts. The impacts of the spill were spread across various geographic areas, and the extent of the impacts on people and businesses were shaped by various factors, such as the structure of an area's economy, clean-up activities, the reparations process, and public perceptions. Tourism rebounded after the initial decline and employment was relatively stable in most areas following DWH. Find the Technical Announcement here.

Investigating the impact on potential shipwreck sites



Side scan sonar image of shipwreck recorded during the study

BOEM's Marine Minerals Program issues permits for the use of Federal Outer Continental Shelf (OCS) sand resources for State coastal restoration and protection projects. Following the Deepwater Horizon accident, emergency response plans included dredging offshore sand to create sediment barriers against the encroaching oil spill. As part of this and all other OCS sand extraction projects, archaeological surveys are conducted prior to sand removal to ensure that no historically significant sites are damaged by dredging operations.

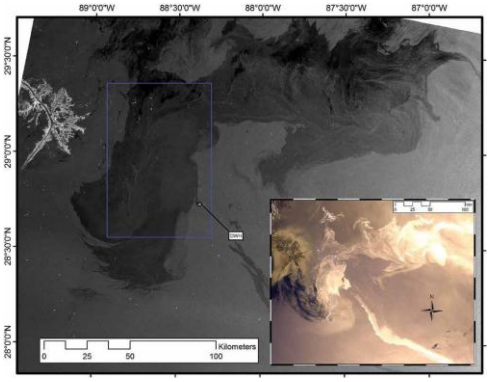
Another study is investigating potential historic shipwreck sites that may have been affected by previous sand extraction projects, including the Deepwater Horizon spill response, to determine if BOEM's archaeological avoidance and mitigation strategies are effective. The results of this study will be used to inform future decision making regarding archaeological site protection during BOEM-permitted dredging of OCS sediments for coastal restoration projects. This study will also document and interpret any historically significant shipwrecks that may be identified during these investigations, including nominating any eligible properties to the National Register of Historic Places. For more information about this study, please see the study profile.

Submerged cultural resources, such as historic shipwrecks, are especially vulnerable to environmental or human-induced damage. Historic shipwrecks are unique—each site has its own place in our collective history and has a story to tell. Unfortunately, damage to shipwrecks is permanent and irreversible. Recognizing that no studies of the Deepwater Horizon spill were examining potential impacts to historic shipwrecks, BOEM initiated and funded a major study in 2013. Federal, academic, and private sector partners include the U.S. Naval Research Laboratory, George Mason University, Bureau of Safety and Environmental Enforcement, and C&C Technologies, Inc., among others. The Gulf of Mexico Shipwreck Corrosion, Hydrocarbon Exposure, Microbiology, and Archaeology project (GOM-SCHEMA), is examining impacts from the 2010 spill on 19th century wooden-hulled and World War II-era metal-hulled shipwrecks and their resident microbial communities. BOEM seeks to understand how shipwrecks within the spill area and their microbial communities were affected by exposure to oil and chemical dispersants in comparison with shipwrecks outside of the spill area. Ultimately, we hope to better understand how impacts to microbial communities may alter the shipwrecks' natural degradation processes and affect their long-term preservation and role as deepwater ecosystems.

For more information about the GOM-SCHEMA project, please see the project websites. Find BOEM's study profiles for this project at: GM-13-03a, GM-13-03b, and GM-13-03c.

Photo Info: Close-up view of the Ewing Bank Wreck's bow showing copper sheathing attached to the wooden hull and a diverse community of corals, anemones, and other biota. This 19th century ship now rests in more than 2,000 feet of water. (Photo by Global Explorer ROV. Image courtesy of BOEM, July 2014.)

Fate and movement of spilled oil in surface waters



Synthetic Aperture Radar (SAR) taken on May 24, 2010 showing dark features near the Deepwater Horizon oil platform that are thought to be surface oil slicks, with a corresponding MERIS image in the lower right inset.

Aspects of the fate and movement of spilled oil in surface waters during the Deepwater Horizon event were captured by multiple remote sensing platforms deployed during the response efforts 5 years ago after the explosion. An overarching goal of a BOEM study is to better understand the movement of surface-oil in the Gulf of Mexico, using satellite and aerial imagery from the Deepwater Horizon.

The study is led by Florida State University, with Dr. Ian MacDonald managing the effort. The research uses data from a combination of remote sensing platforms and the best

existing algorithms for determining surface oil spatial extent and thickness. These data and algorithms have been crucial in determining the true extent and characterization of Deepwater Horizon surface oil, and have also informed the Natural Resource Damage Assessment (NRDA) process. The study team is also using physical oceanographic and wind forcing models to identify the factors that influence oil transport. This is part of the long-term monitoring and research we are conducting to determine various impacts of the spill. Study profile.

Analysis of the impacts of Deepwater Horizon on the seafood industry

Some of the most severe and complex economic effects of the Deepwater Horizon accident (DWH) were on the Gulf of Mexico seafood industry. While there have been some prior analyses of parts of these effects, one of our studies builds a framework for analyzing these economic effects in aggregate. In particular, this project is creating a model that examines the effects of initial shocks (such as the DWH) throughout the supply chains of various fisheries. In particular, the model estimates the impacts of a change in fishermen's revenues for a certain species (such as shrimp or oysters) to harvesters, dealers, processors, distributors, marketers, and restaurants. This study also entails a descriptive analysis of the DWH impacts on the seafood industry, which provides context to the model's results. While this study does not -- and could not -- answer all questions regarding the impacts of the DWH, it provides a useful framework for understanding the impacts to the seafood industry that future researchers can build upon. BOEM can also use the results from this study to analyze the effects of various potential future events on the seafood industry. Read more here.

Assessment of oil spill impacts on coastal archaeological sites

BOEM is committed to preservation of the Nation's archaeological and historic sites. A study titled, "Assessment of the Effects of an Oil Spill on Coastal Archaeological Sites," was commissioned in response to concerns by the State of Louisiana for coastal archaeological sites that may have been adversely affected by the *Deepwater Horizon* oil spill in 2010. So far, archaeologists have completed test excavation on five archaeological sites that may have been impacted by the spill. Seven more sites are likely to be examined before the study is completed in late 2017. This research also highlights how BOEM is seeking diverse scientific analyses on the impacts from the 2010 oil spill by utilizing expertise in anthropology, archaeology, chemistry, environmental sciences, geology, and even nuclear engineering from many universities, Federal and State agencies, and private scientific institutions. They include the following: University of Louisiana at Lafayette, Bureau of Ocean Energy Management, Louisiana Division of Historic Preservation in the Office of Cultural Development, Louisiana Department of Wildlife and Fisheries, Louisiana Universities Marine Consortium, Louisiana Archaeological Survey and Antiquities Commission, Gulf Coast Cooperative Ecosystem Studies Unit, Louisiana State University, Beta Analytic Laboratory, University of Missouri and the University of North Carolina, Wilmington. Read more.